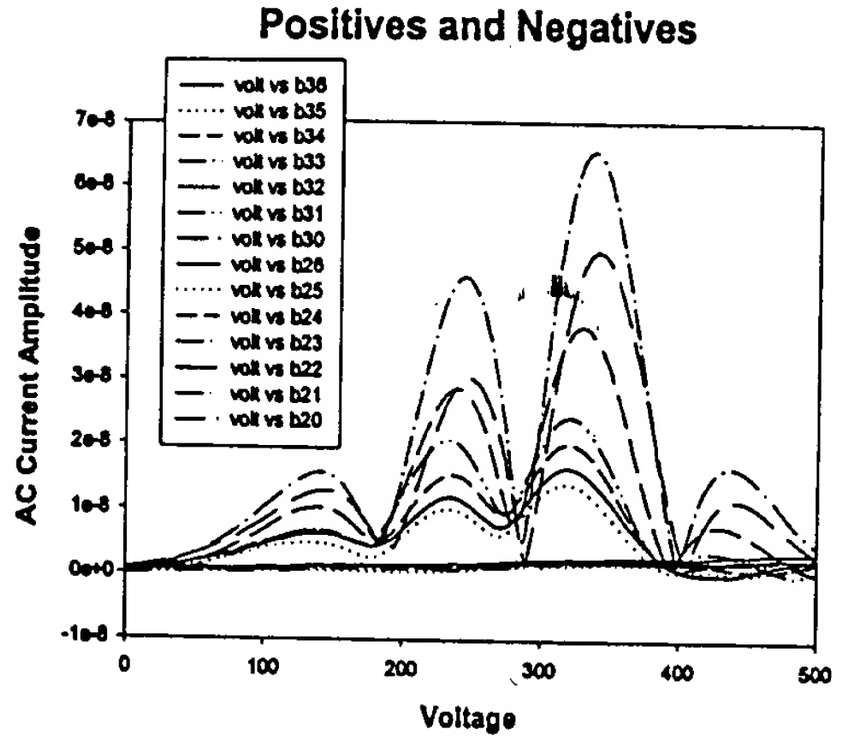
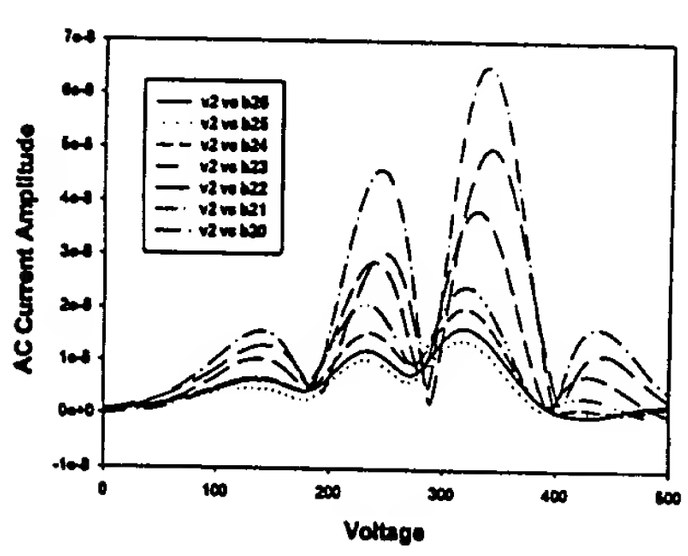
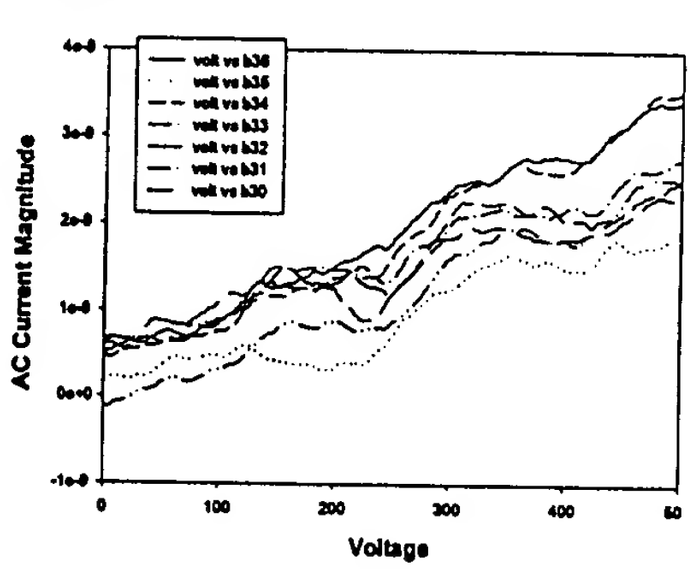


Fig 1



Positives



Negatives

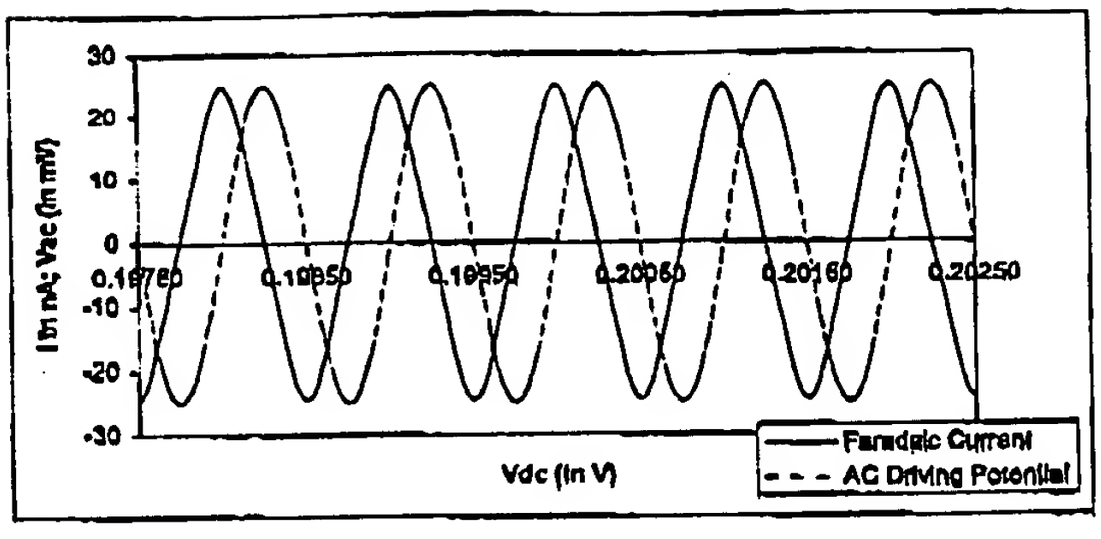
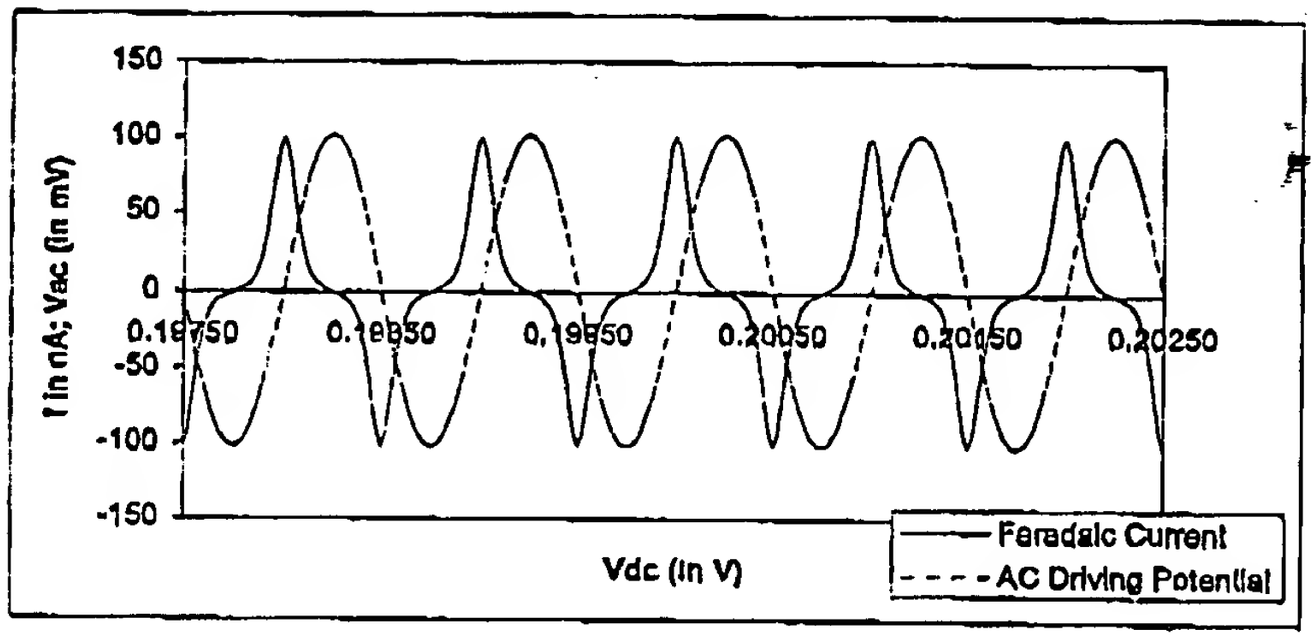
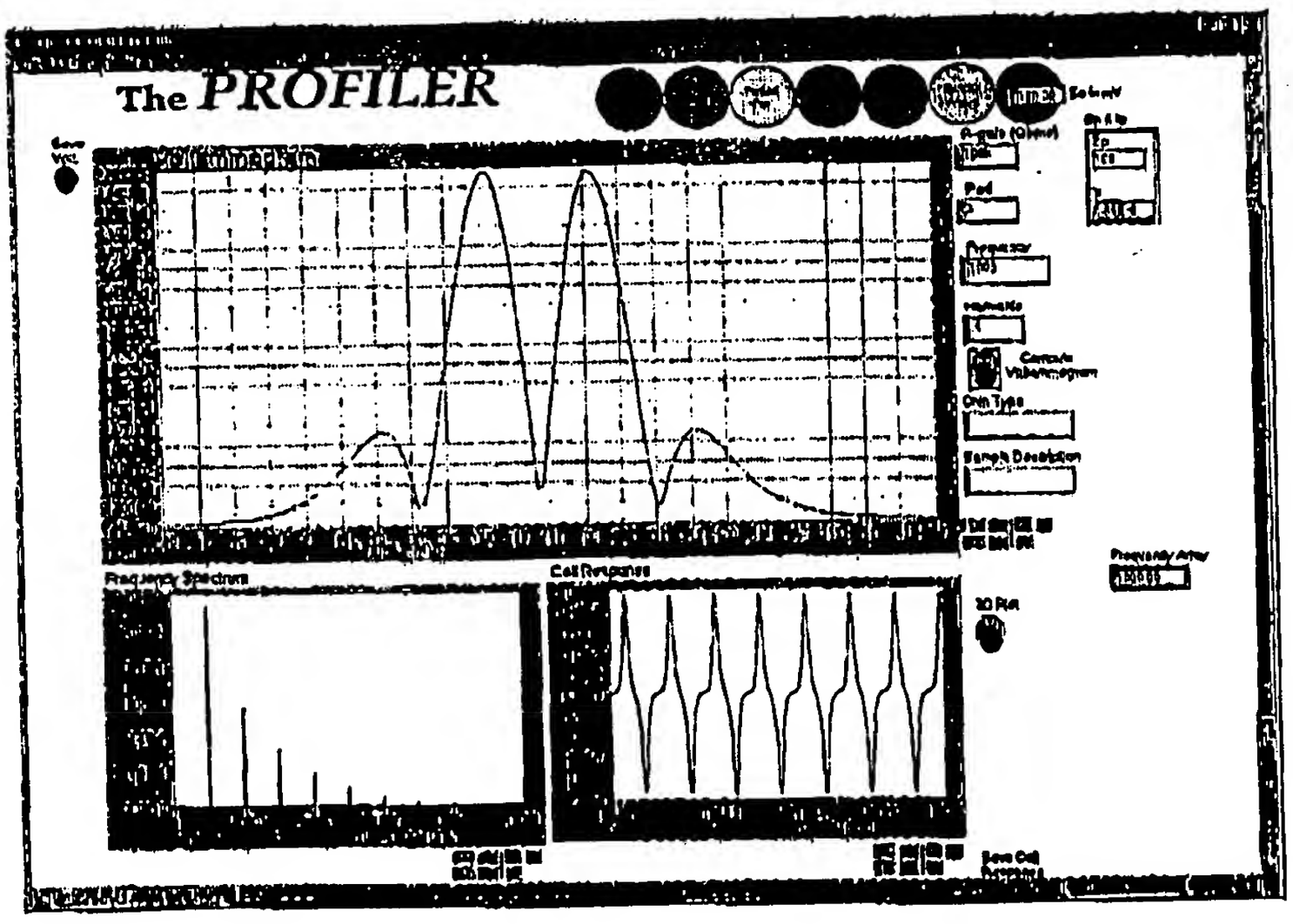

30
20
10
0
-10
-20
-30
I in nA; Vac (in mV)
0.19750
0.19850
0.19950
0.20050
0.20150
0.20250
Vdc (in V)
Faradaic Current
AC Driving Potential

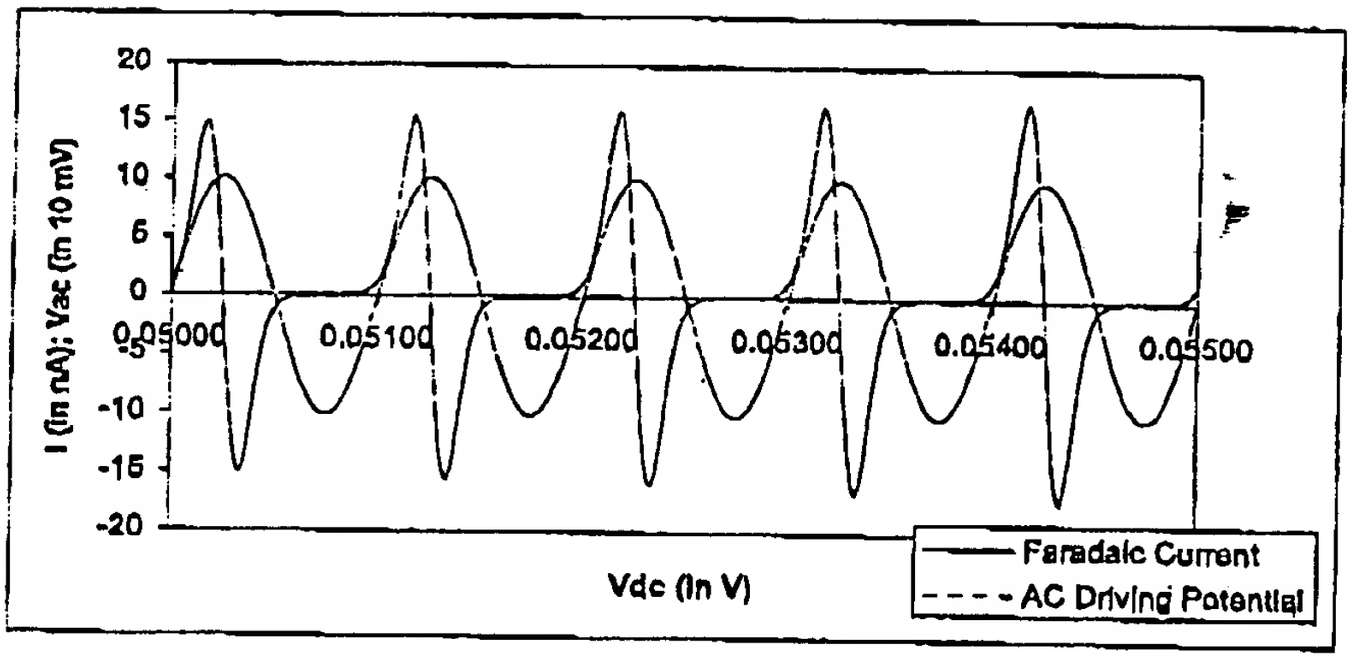
Fig 2A


150
100
50
0
-50
-100
-150
I in nA; Vac (in mV)
0.19750
0.19850
0.19950
0.20050
0.20150
0.20250
Vdc (in V)
Faradaic Current
AC Driving Potential

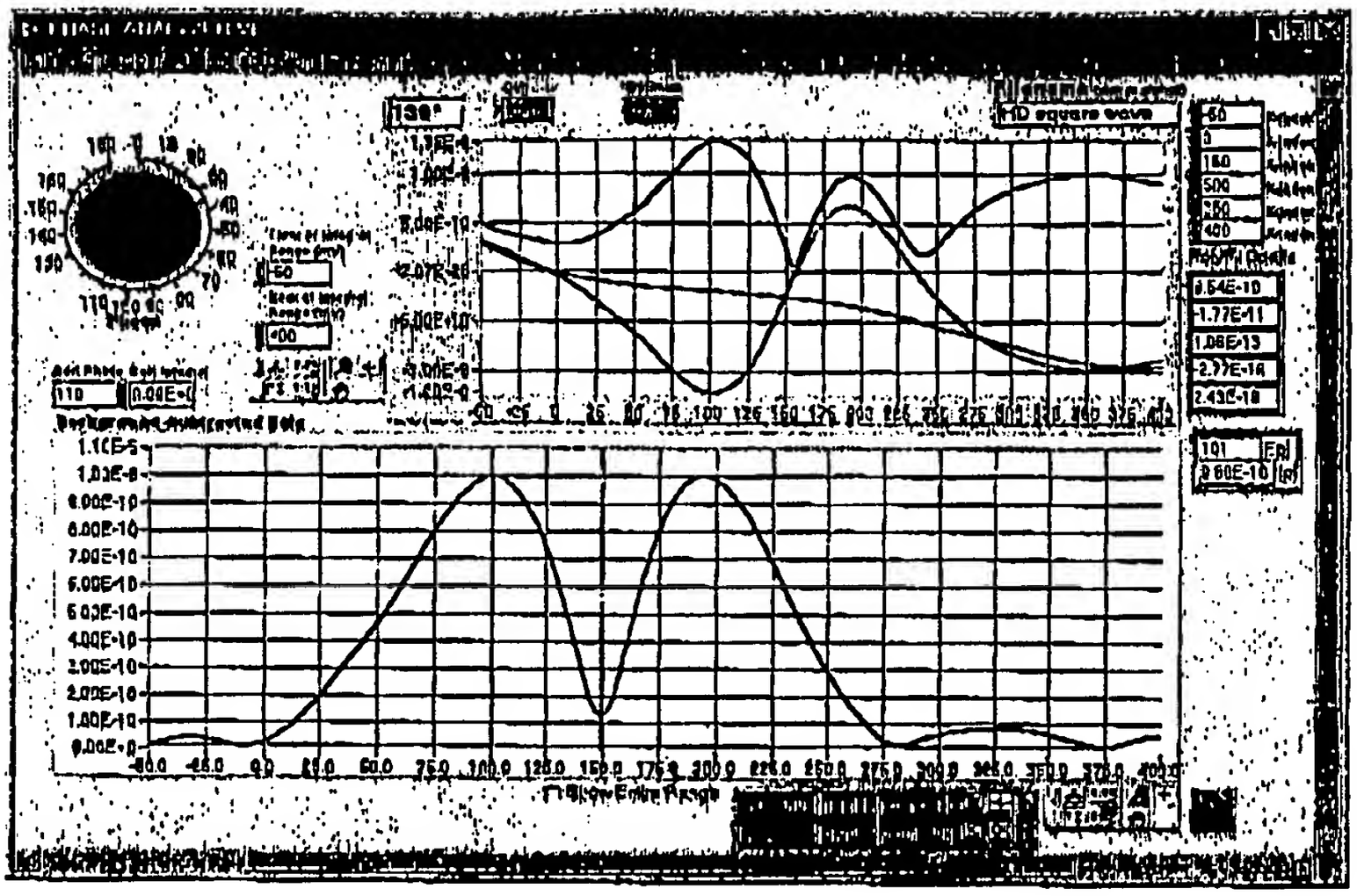
2B


The PROFILER

2C


20
15
10
6
0
-5
-10
-15
-20
I (in nA); Vac (in 10 mV)
0.05000
0.05100
0.05200
0.05300
0.05400
0.05500
Vdc (in V)
Faradaic Current
AC Driving Potential

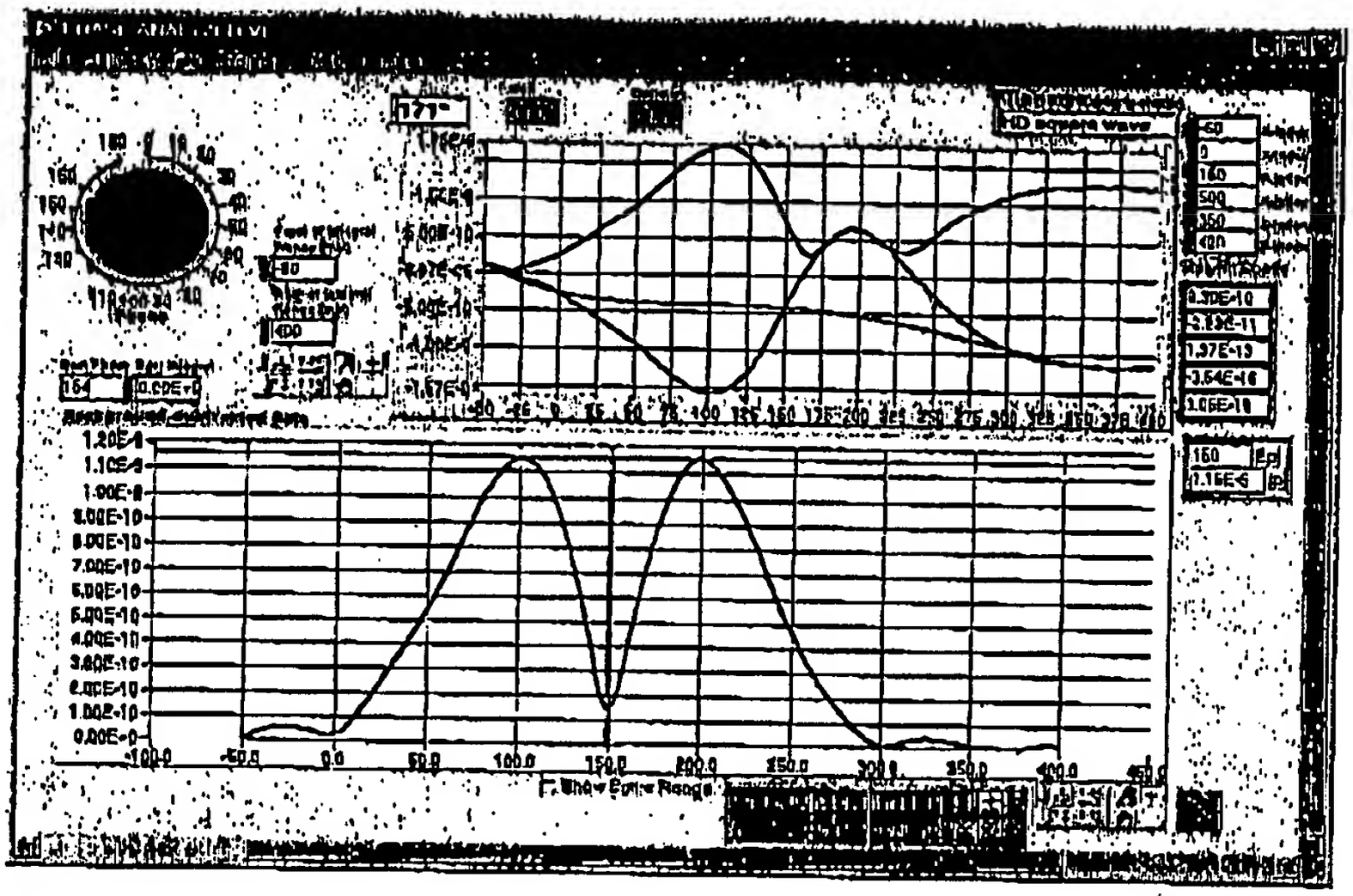
2D



2nd harmonic SW

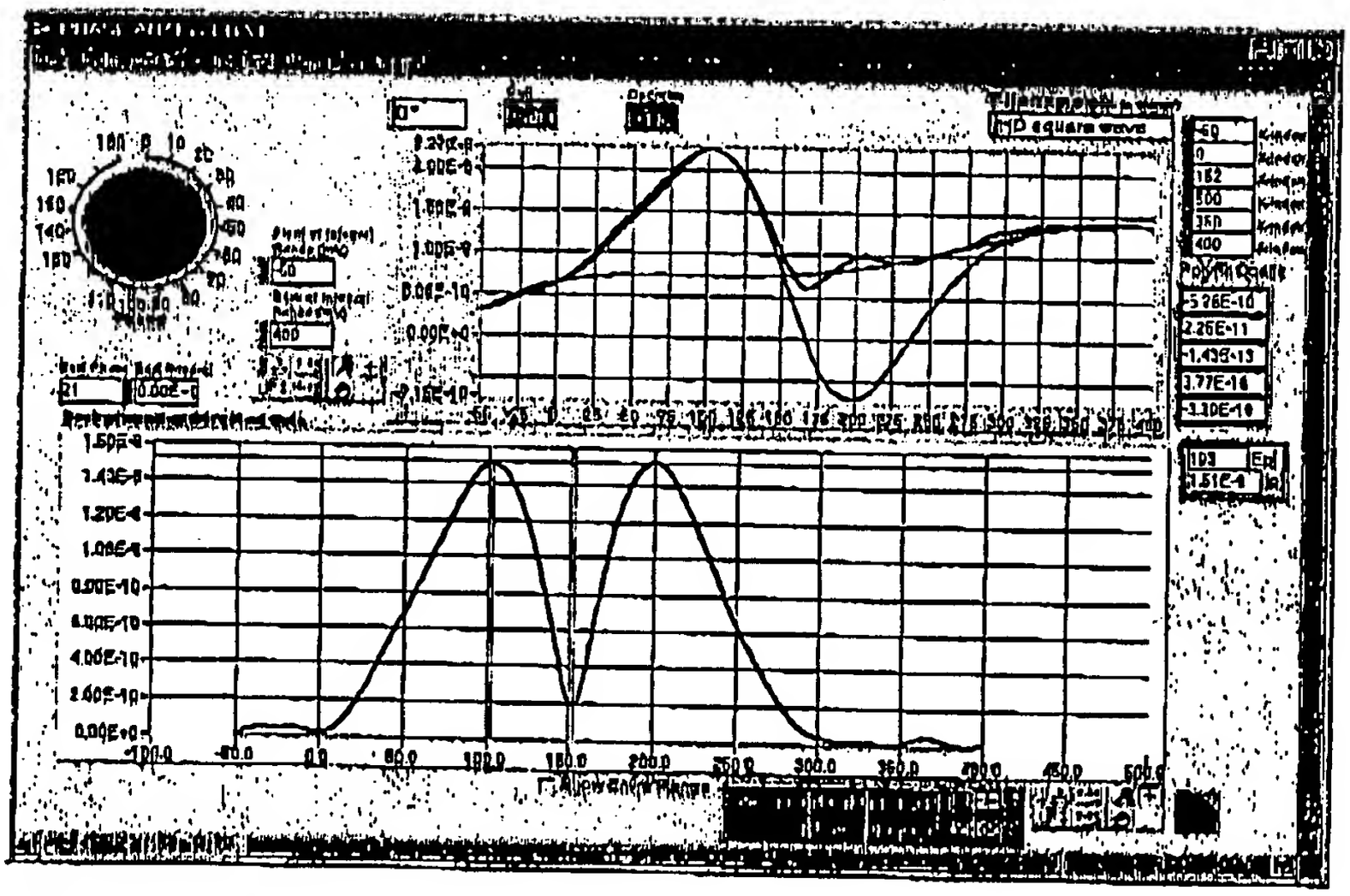
Fig 3A

3B



4th harmonic SW

3C



6th Harmonic SW

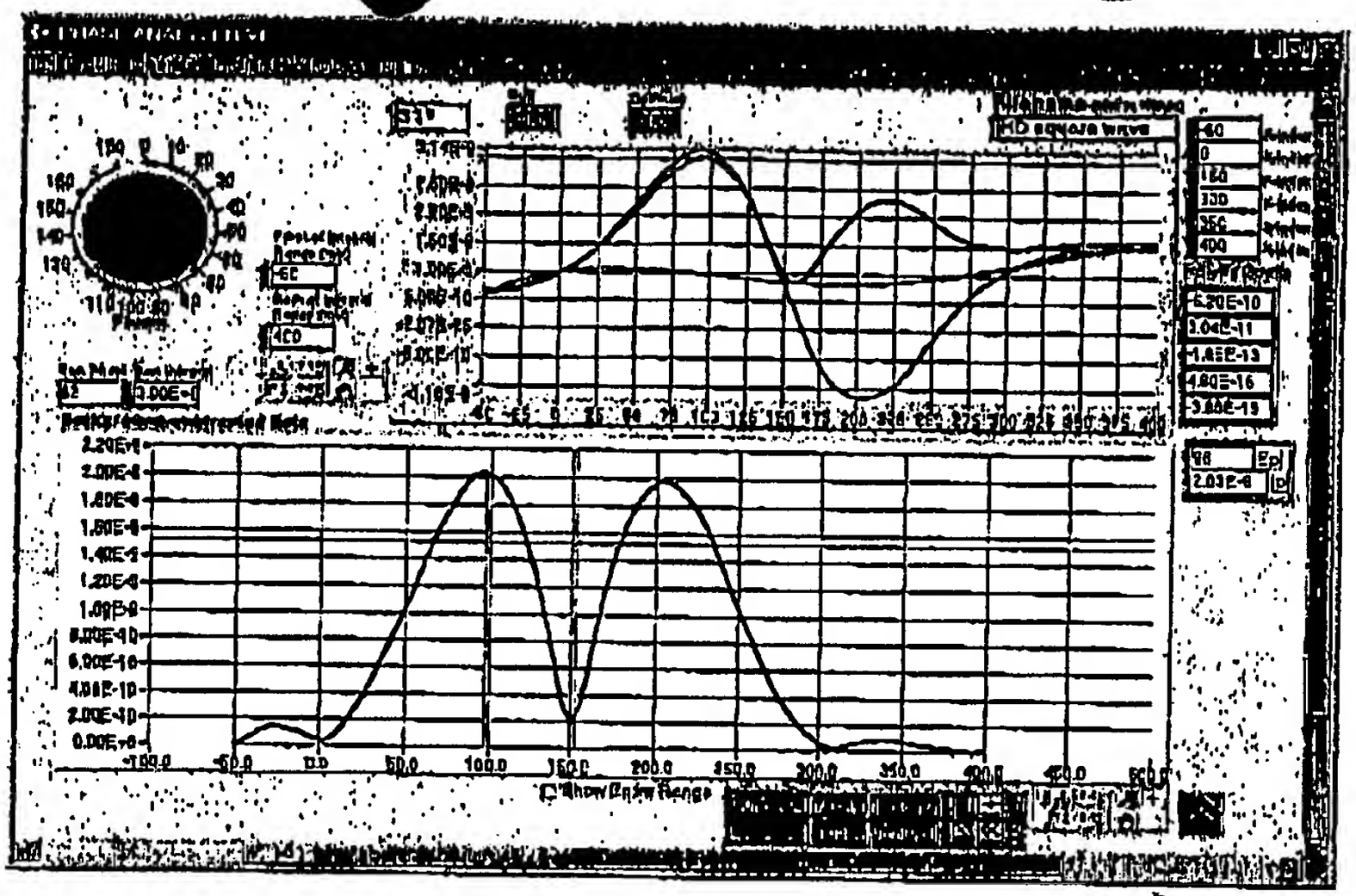
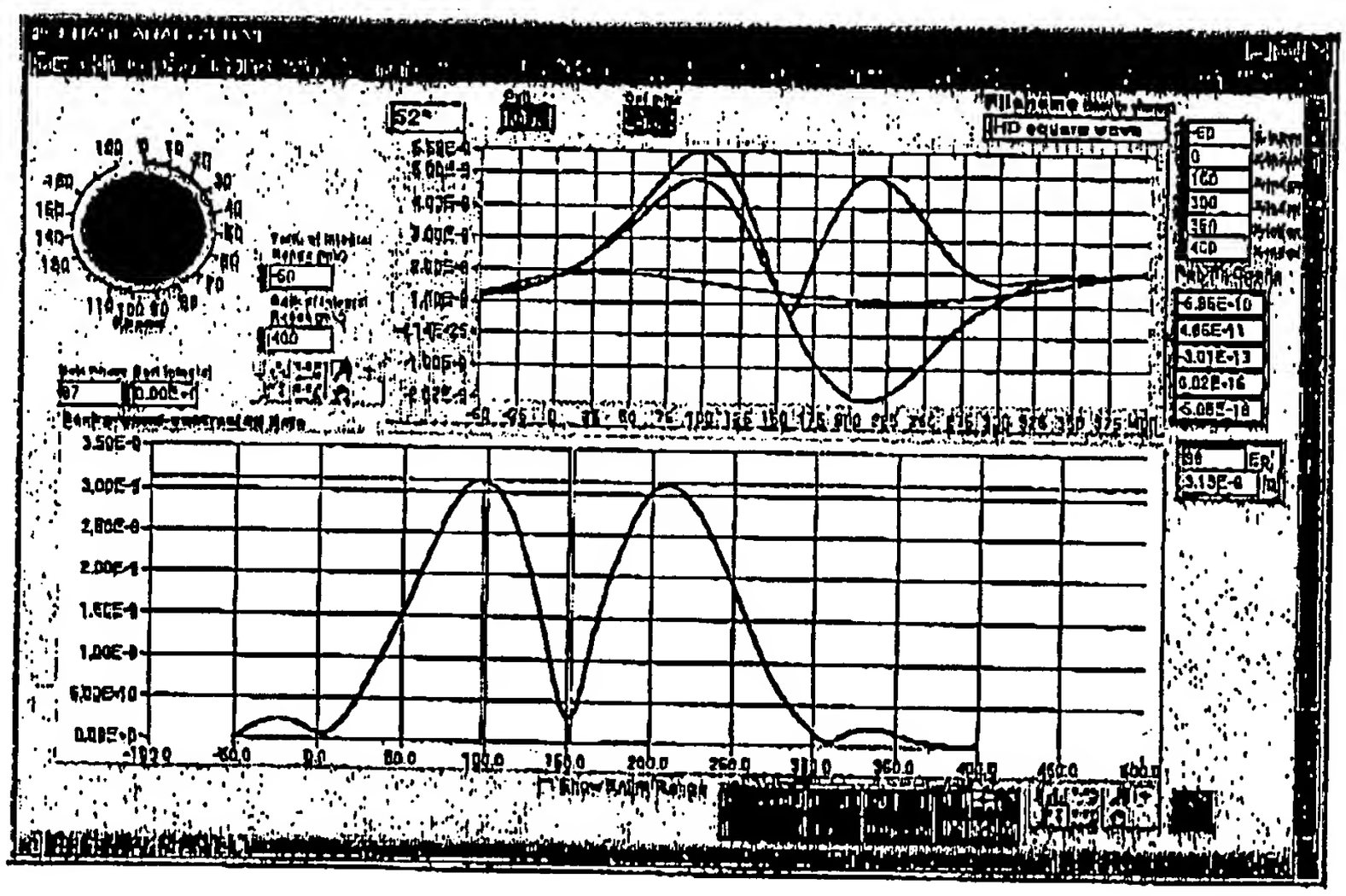


Fig 3D

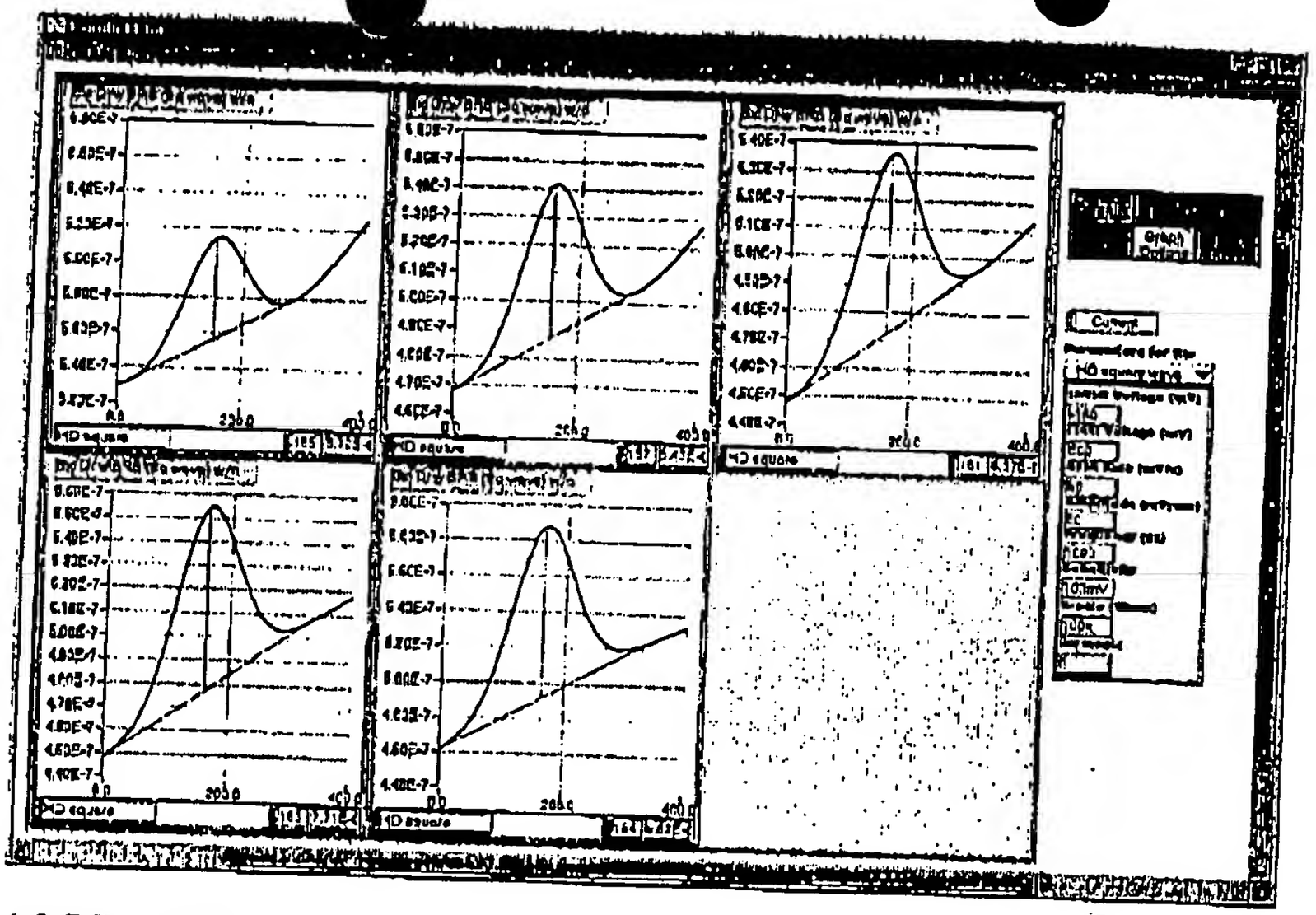
8th Harmonic SW



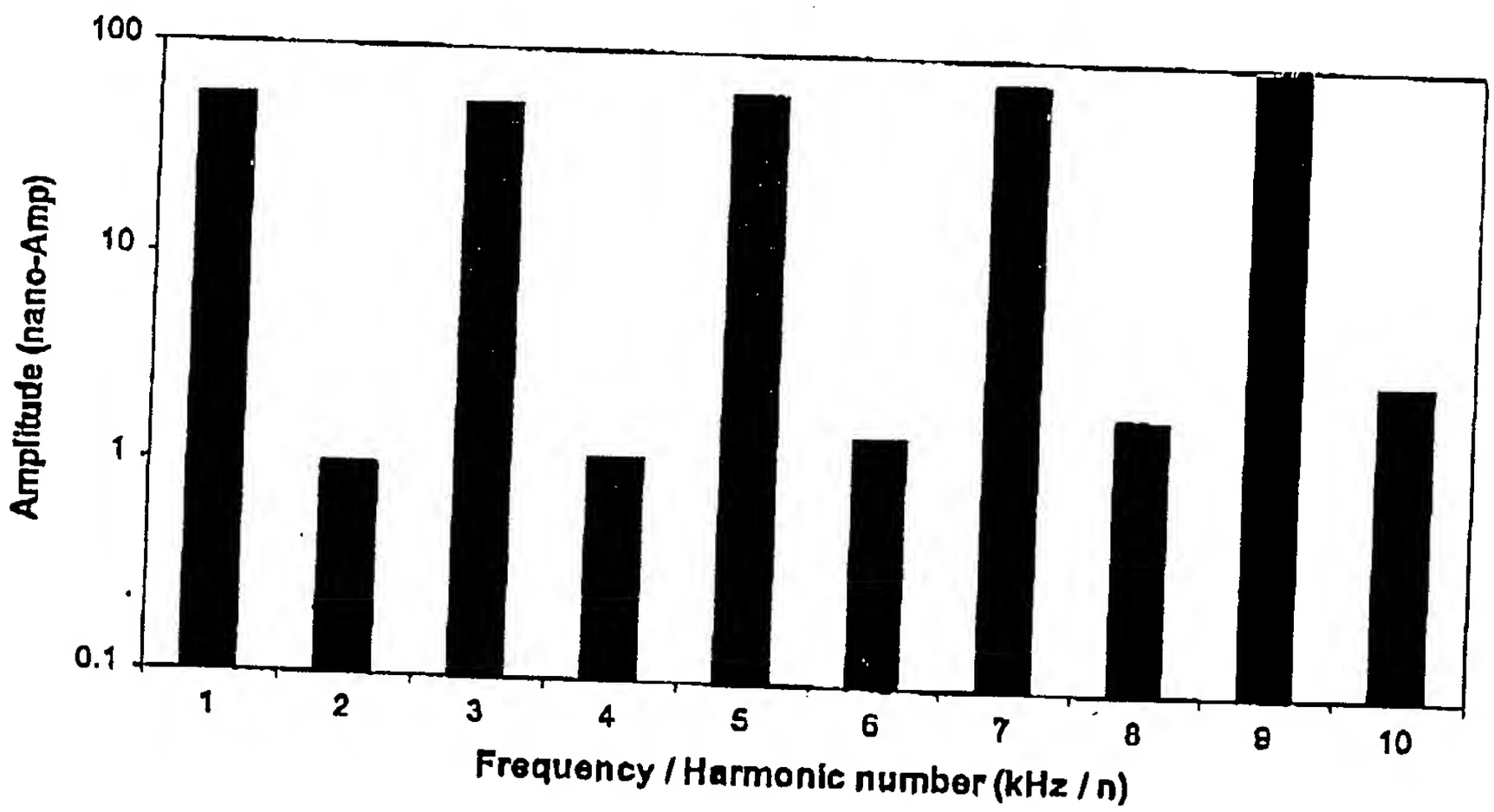
3E

10th harmonic SW

3F



1,3,5,7, and 9th harmonic SW



3G

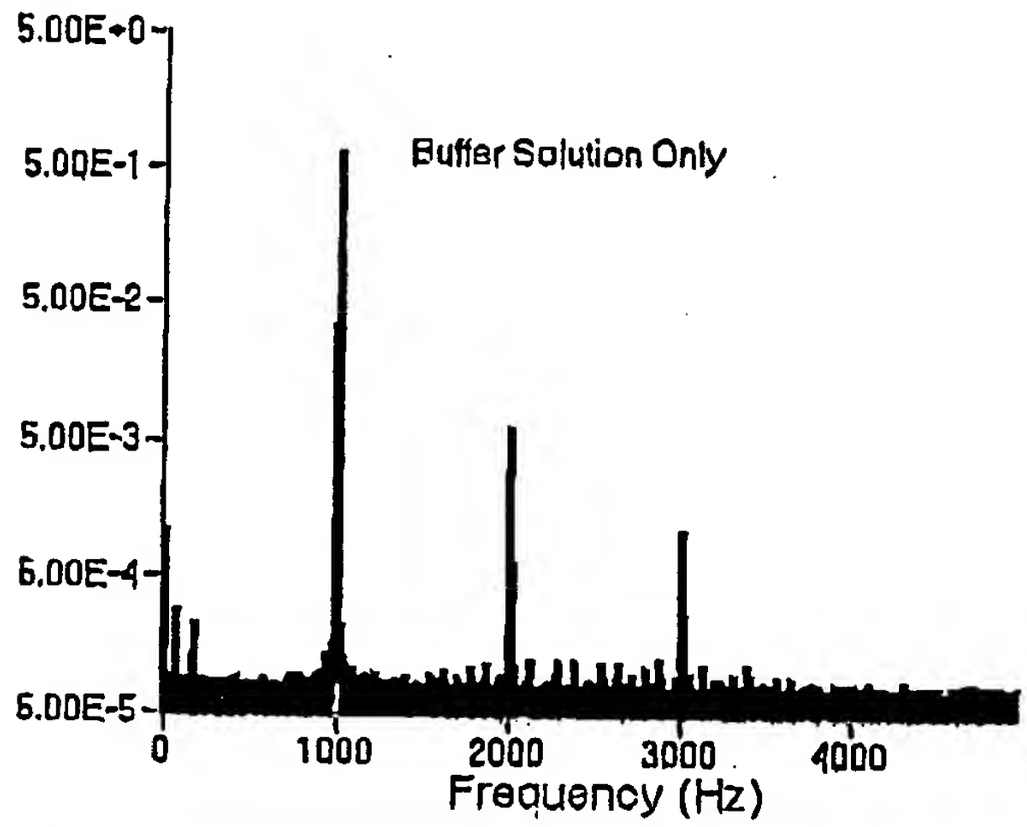

Buffer Solution Only
5.00E+0
5.00E-1
5.00E-2
5.00E-3
5.00E-4
5.00E-5
0
1000
2000
3000
4000
Frequency (Hz)

Fig 4A

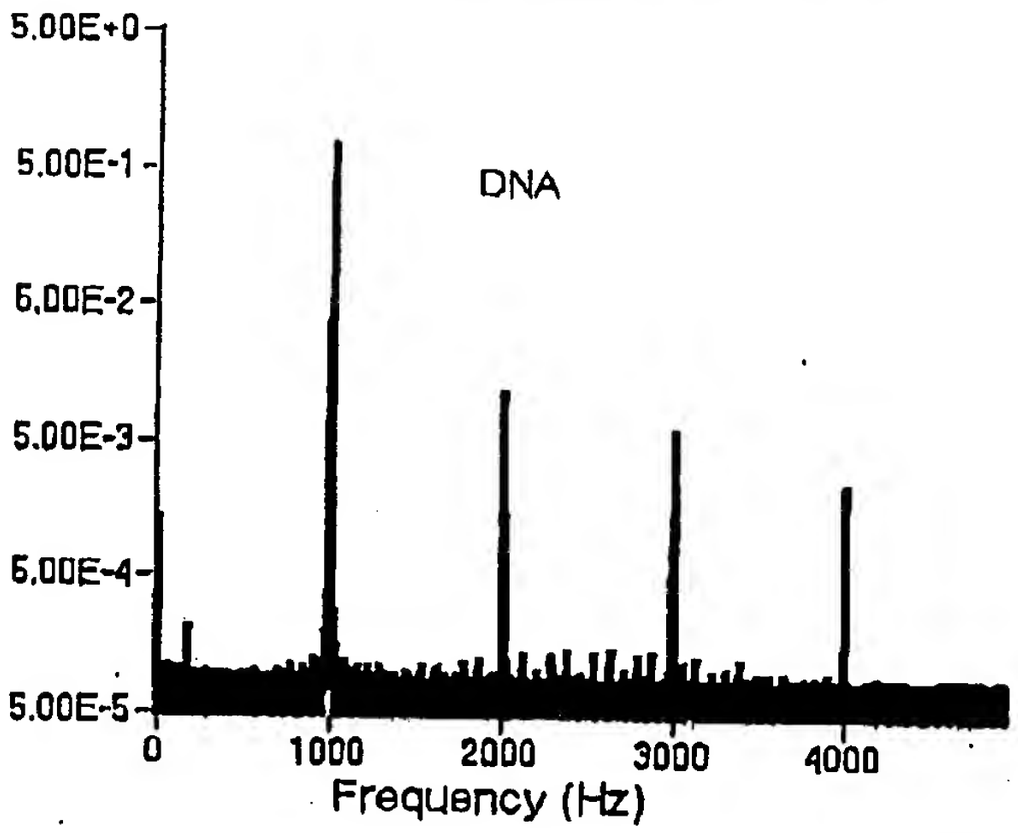
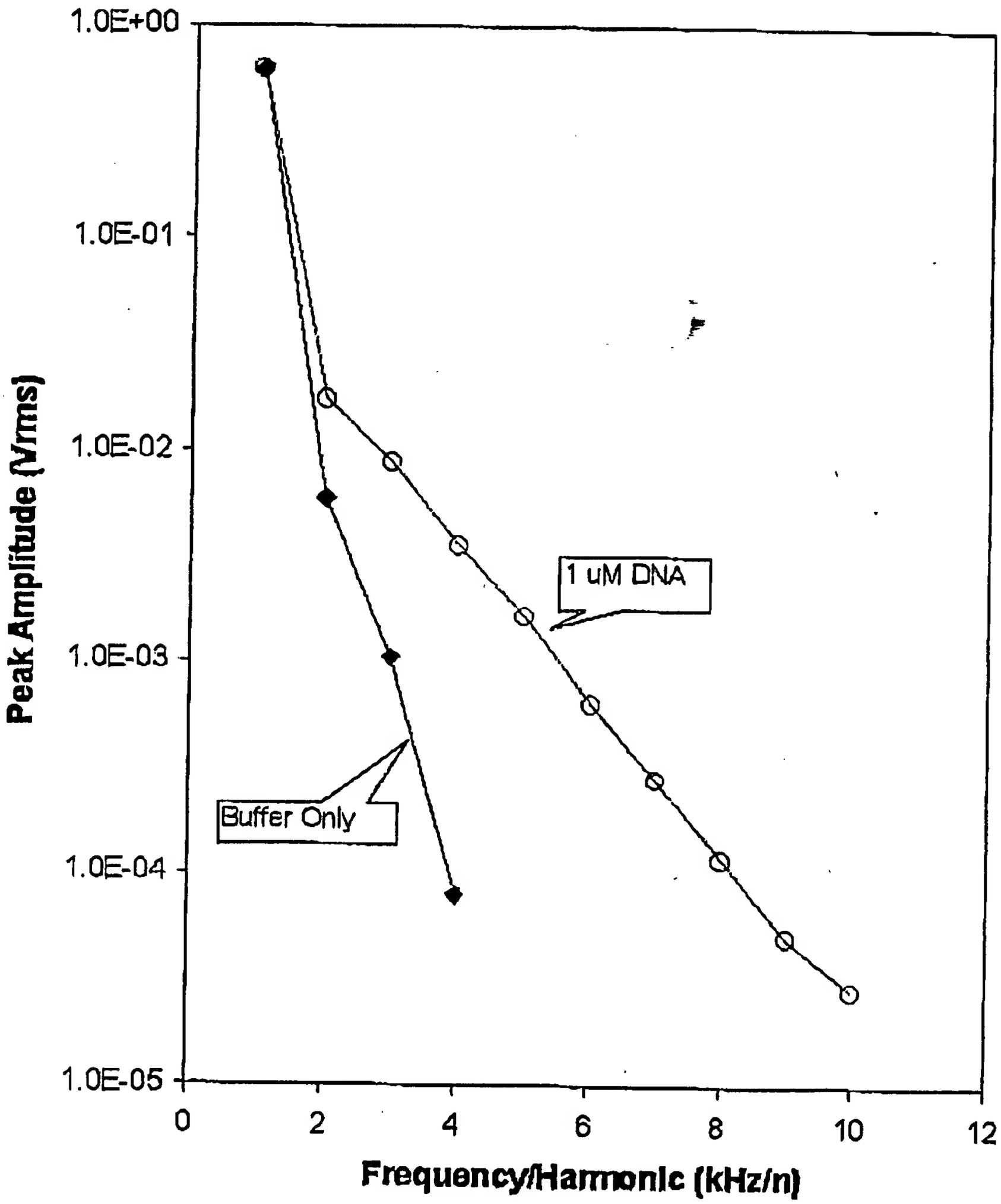
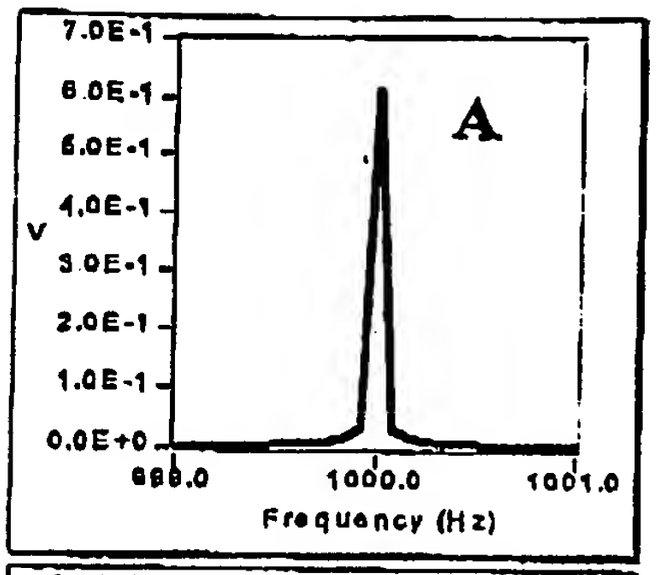
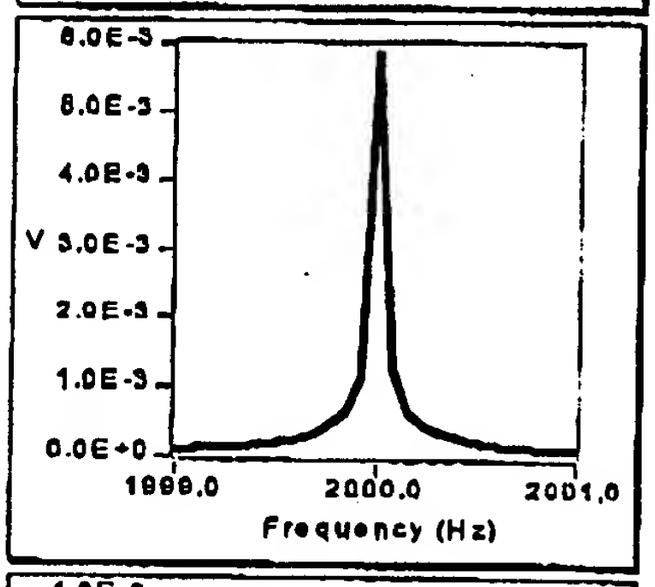

DNA
5.00E+0
5.00E-1
5.00E-2
5.00E-3
5.00E-4
5.00E-5
0
1000
2000
3000
4000
Frequency (Hz)

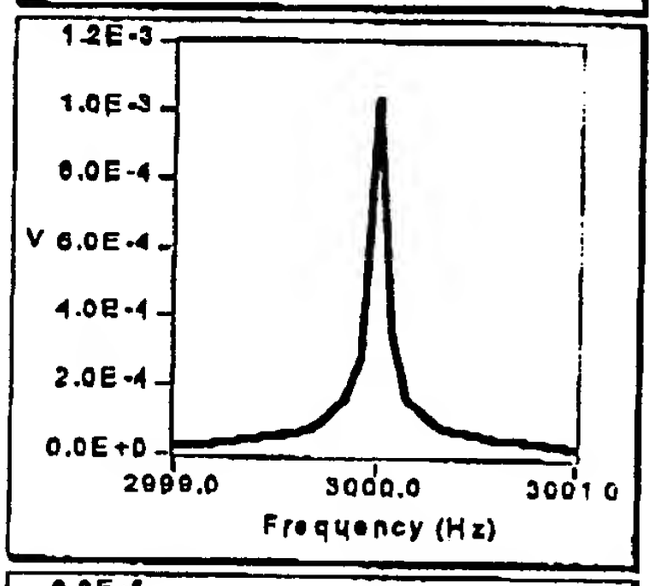
Fig 4B

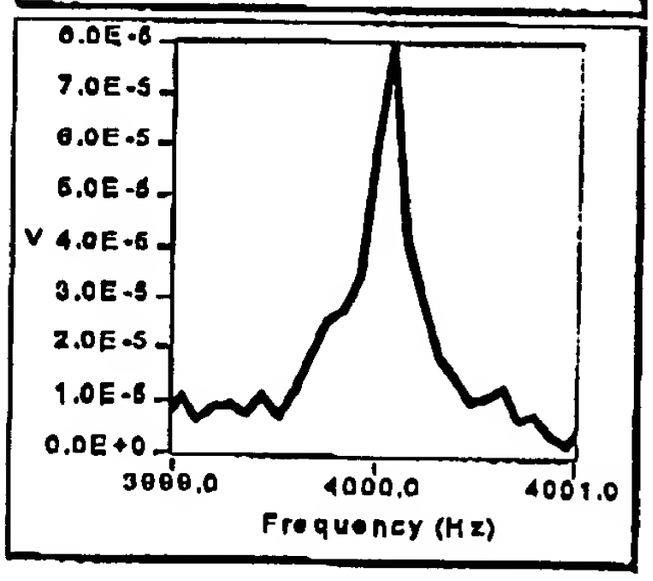
Fig 5

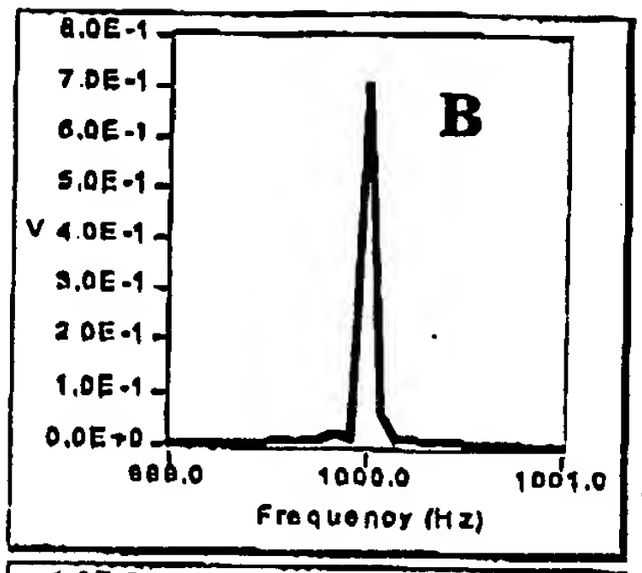

1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
Peak Amplitude (Vrms)
1 uM DNA
Buffer Only
0
2
4
6
8
10
12
Frequency/Harmonic (kHz/n)

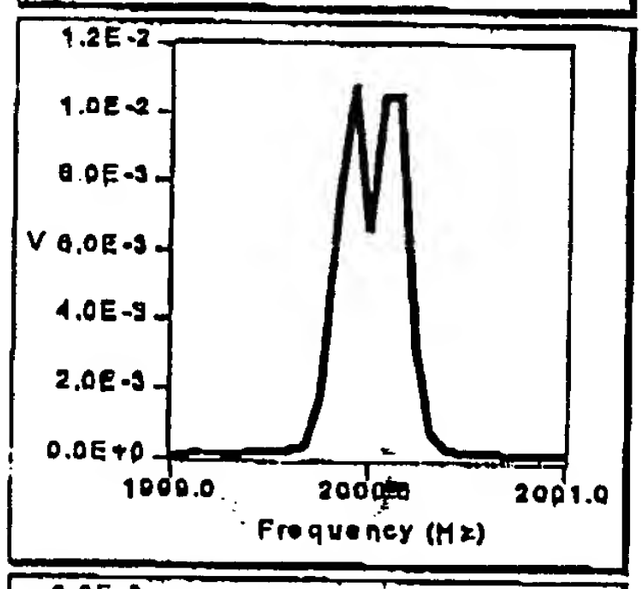

A
7.0E-1
6.0E-1
5.0E-1
4.0E-1
V
3.0E-1
2.0E-1
1.0E-1
0.0E+0
999.0
1000.0
1001.0
Frequency (Hz)

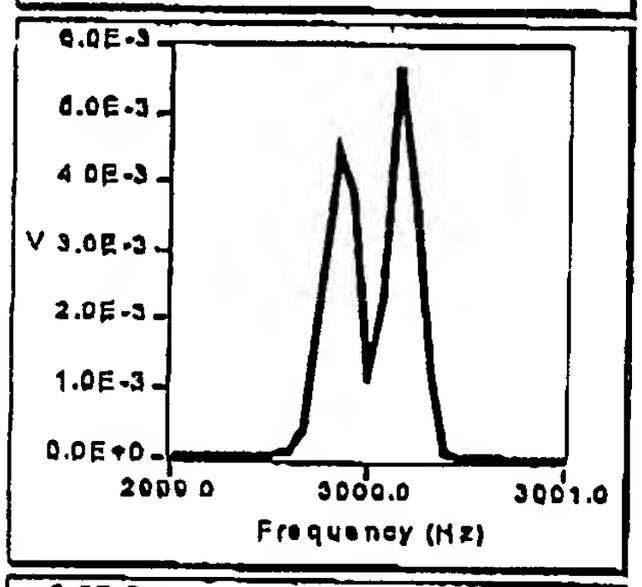

8.0E-3
4.0E-3
V 3.0E-3
2.0E-3
1.0E-3
0.0E+0
1999.0
2000.0
2001.0
Frequency (Hz)


1.2E-3
1.0E-3
8.0E-4
V 6.0E-4
4.0E-4
2.0E-4
0.0E+0
2999.0
3000.0
3001.0
Frequency (Hz)


8.0E-5
7.0E-5
6.0E-5
5.0E-5
V 4.0E-5
3.0E-5
2.0E-5
1.0E-5
0.0E+0
3999.0
4000.0
4001.0
Frequency (Hz)


B
8.0E-1
7.0E-1
6.0E-1
5.0E-1
V 4.0E-1
3.0E-1
2.0E-1
1.0E-1
0.0E+0
999.0
1000.0
1001.0
Frequency (Hz)


1.2E-2
1.0E-2
8.0E-3
V 6.0E-3
4.0E-3
2.0E-3
0.0E+0
1999.0
2000.0
2001.0
Frequency (Hz)


8.0E-3
6.0E-3
4.0E-3
V 3.0E-3
2.0E-3
1.0E-3
0.0E+0
2999.0
3000.0
3001.0
Frequency (Hz)

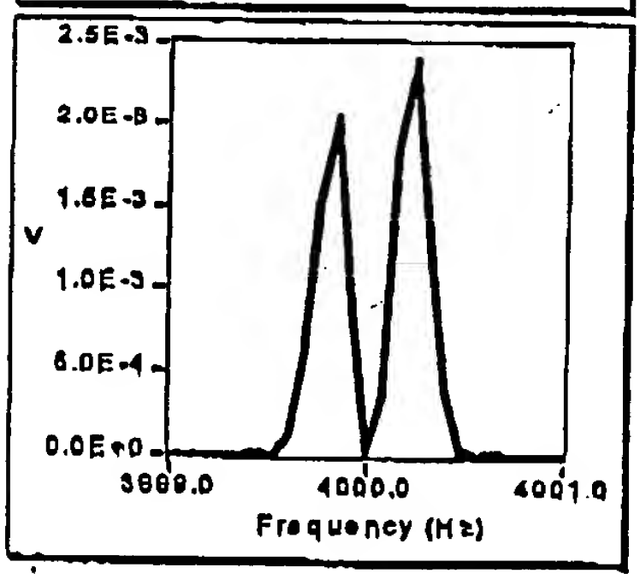

2.5E-3
2.0E-3
1.5E-3
V
1.0E-3
6.0E-4
0.0E+0
3999.0
4000.0
4001.0
Frequency (Hz)

Fig 6

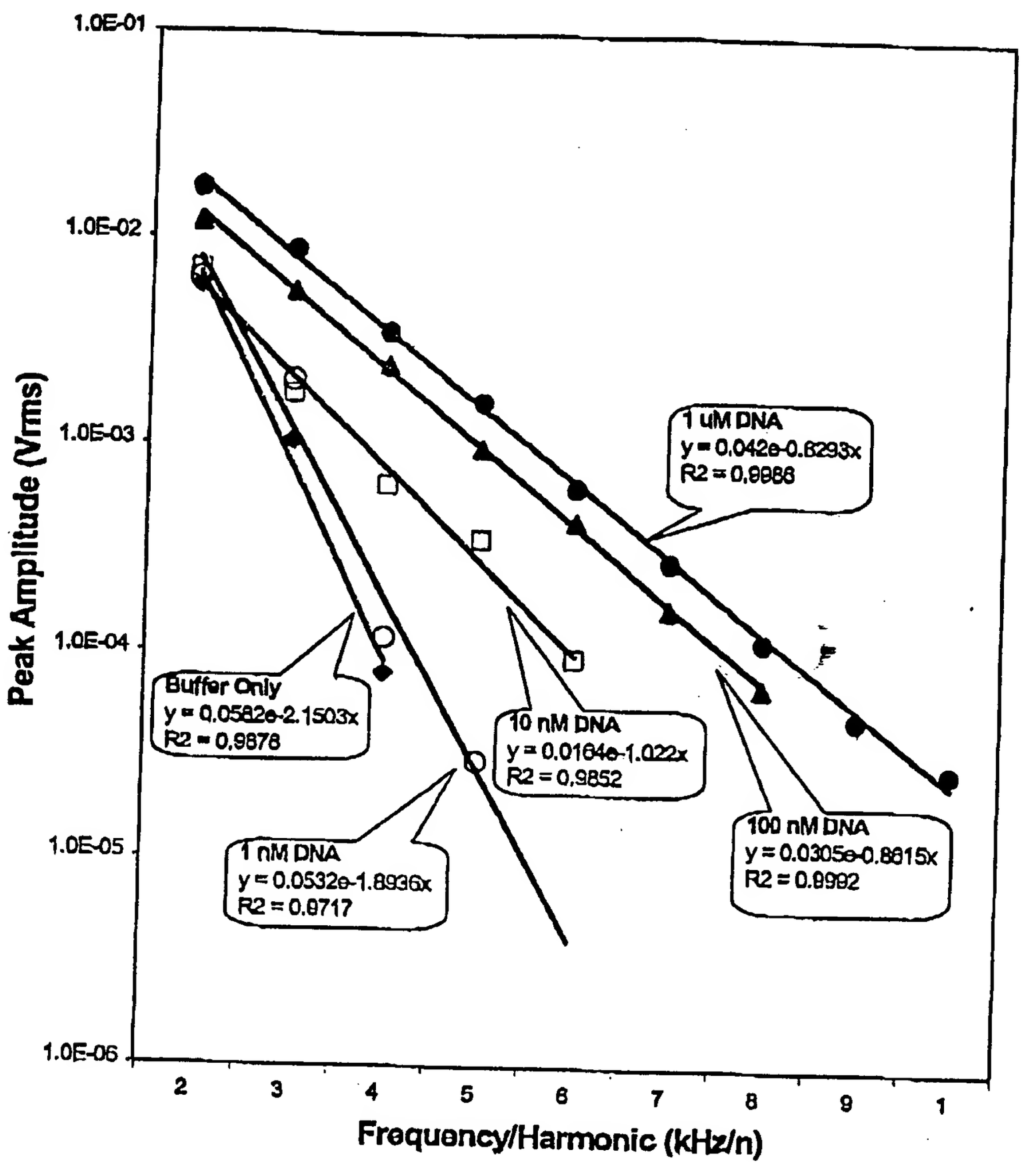


Fig 7

Figure 4. *Results from the detection level study. The y-axis is the peak amplitude of the harmonics (n ≥ 2) at different DNA concentration (1 μM - 1 nM) and the x-axis is the frequency and harmonic number. Also shown are data from the buffer solution measurement.*

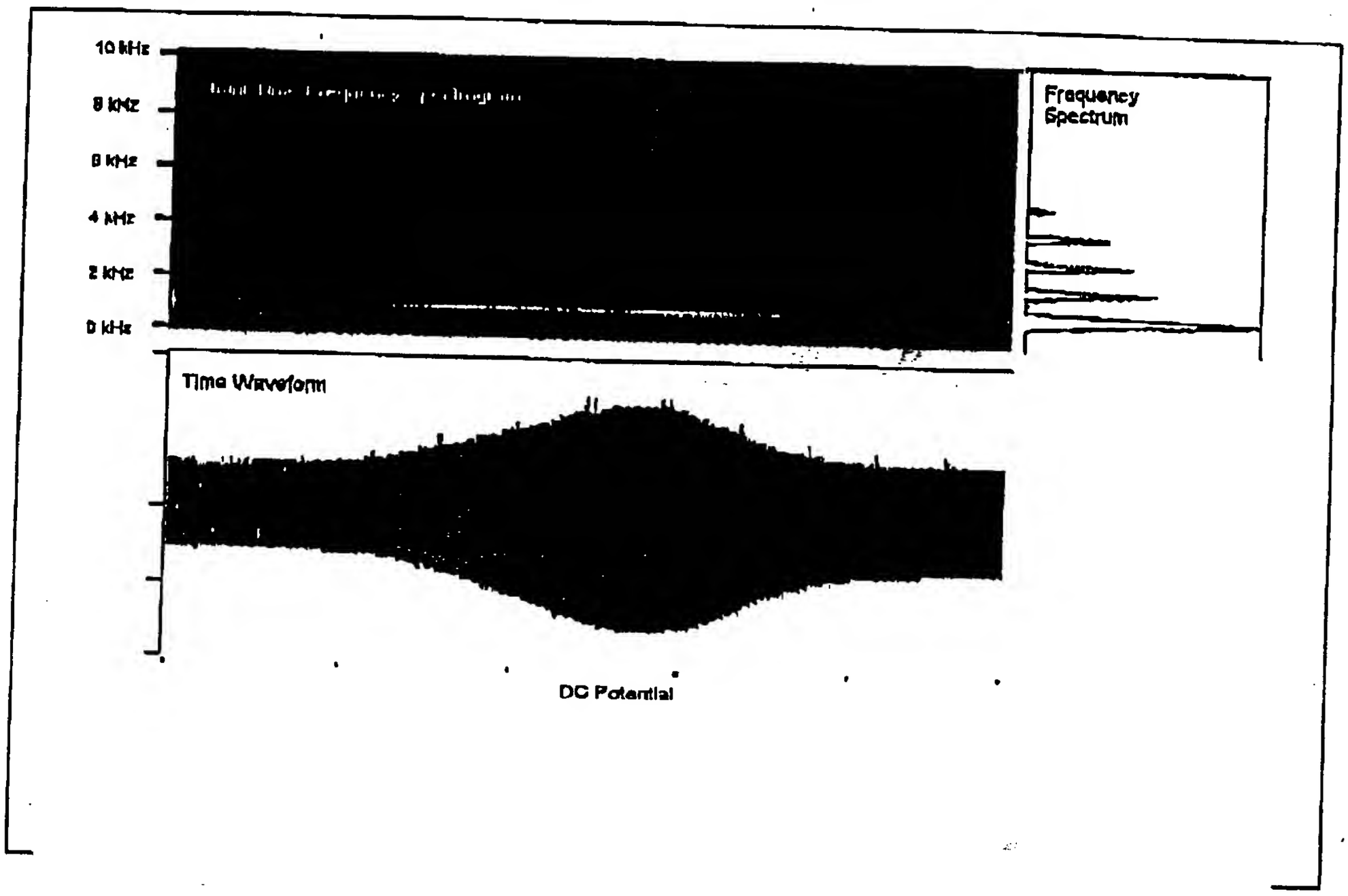

10 kHz
8 kHz
6 kHz
4 kHz
2 kHz
0 kHz
Frequency Spectrum
Time Waveform
DC Potential

Fig 8

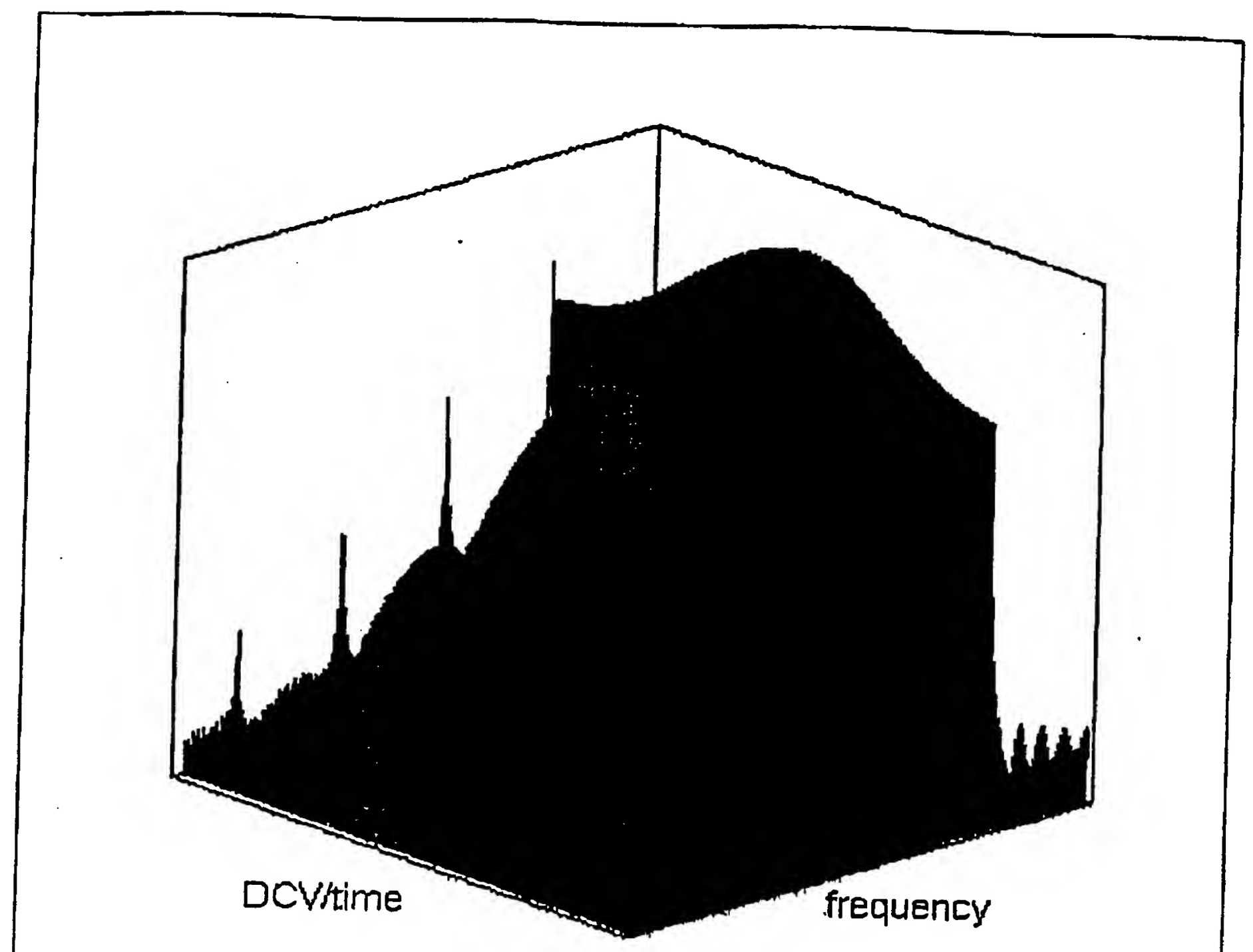


Figure 2. Three-dimensional spectrogram of an ACV scan of a CMS biochip. The amplitude of the cell current is plotted on a log scale to emphasize the higher harmonics. The spectrogram clearly shows the familiar first and fourth harmonic voltammograms. All without a tuned or lock-in amp! More importantly, other harmonics are also present in the spectrogram.

Fig 9

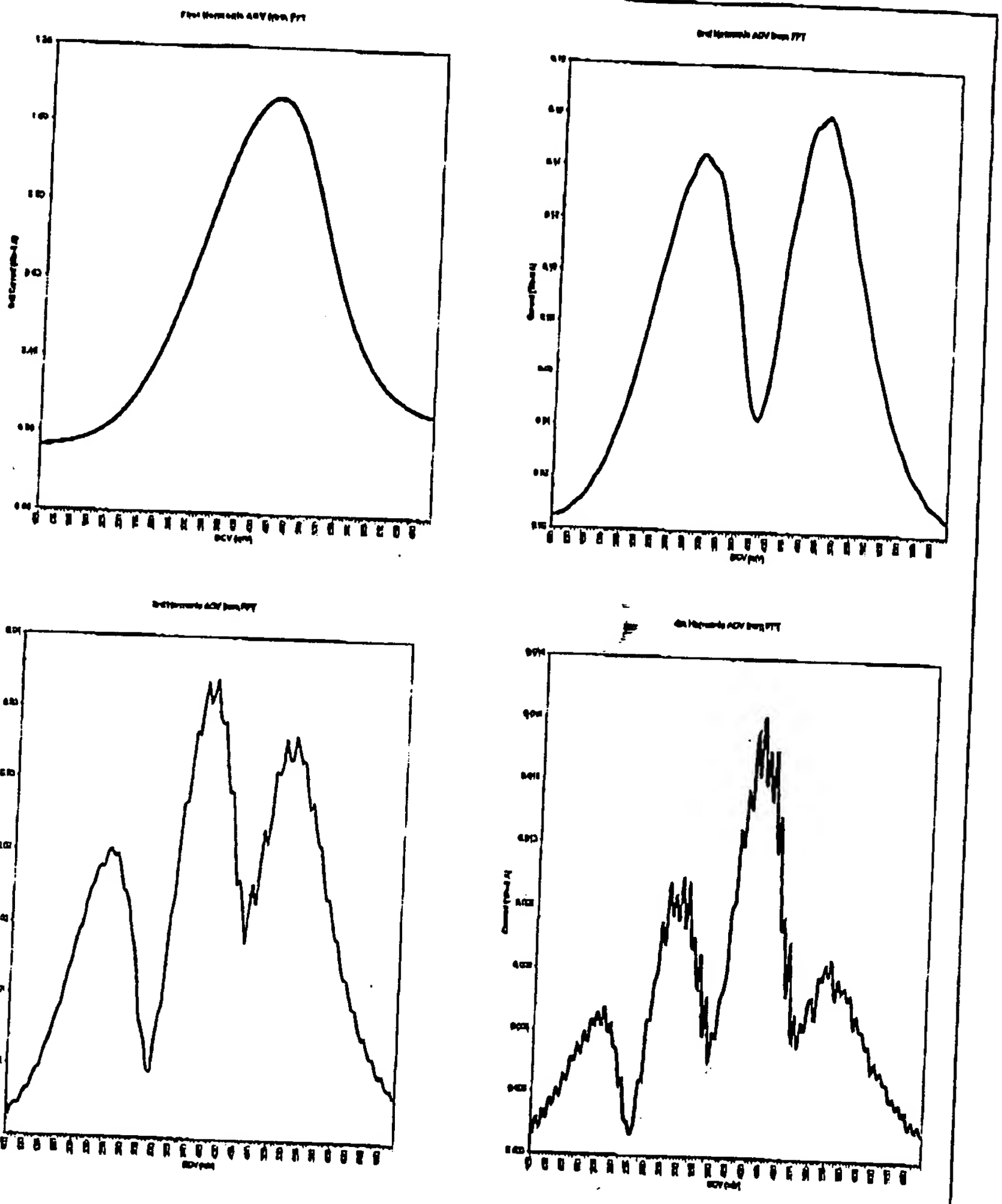


Figure 8. AC voltammogram response at fundamental, second, third, and fourth harmonic using FFT.

Fig 10